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Research Article

Knowledge of UK Dental Professionals in Treating Dentine Hypersensitivity

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Keywords

- Dentine Hypersensitivity; Treatment; Questionnaire; Knowledge; Dentists; Hygienists; Therapists

Abstract

Aim: The aim of the present 22 item questionnaire-based study was to evaluate the knowledge and understanding of a representative sample of UK based Dental professionals in treating DH.

Materials & Methods: A 22-item questionnaire on DH was sent to a representative sample of 2200 Dentists and Dental Hygienists/Therapists (DHTs). The study was submitted to the local Queen Mary University of London Ethics committee (QMREC 03537) and the research did not present any ethical concerns due to its low risk and therefore did not require the scrutiny of the full Research Ethics Committee. The questionnaire consisted of 22 questions, which included both open and closed questions. The addresses were selected from the General Dental Council (GDC) and Dental Hygienist/Therapists Lists and subsequently randomised using a randomised number generator (RNG)(Graph Pad Software Inc. 2002-2005) and the questionnaires were sent out to the selected Dental practices by Royal Mail. The questionnaires were distributed during a six-month period from June 2011. Data were entered using Microsoft Excel, and the results analysed using SPSS 22.0 for Windows (IBM, Portsmouth UK) in presented in the form of frequency distribution tables and figures. Pearson correlations were undertaken to determine whether there were any association between status, impact on the QoL, confidence of recommending at-home treatment to those suffering with DH.

Results: 346 Questionnaires were returned (15.7%), of which 142 Questionnaires were from Dentists (12.9%) and 204 Questionnaires were from (DHTs) (18.5%). Both Dentists and DHTs provided similar responses to the questions with no major differences between the two groups.

Conclusions: These results were consistent with previous studies and, would appear to suggest that, in terms of the knowledge and understanding of DH, both Dentists and DHTs had a broad understanding however there were still some confusion concerning aspects of the diagnosis and management of the condition and clinicians therefore need to be updated on the current recommendations and guidelines in the management of DH to both inform their patients in terms of awareness and prevention and to confidently diagnose and manage DH successfully .

INTRODUCTION

Dentine Hypersensitivity (DH) is a relatively common, yet undiagnosed dental condition that may have an impact on the quality of life (QoL) of those who suffer from it [1-3]. The prevalence of DH has been widely reported in the literature and depending on how the data are collected (by questionnaire or clinical examination) up to 69% [4], may experience transient discomfort which may or may not require at-home administration of a desensitising toothpaste or professional help through visiting a Dentist. It is also evident that patients do not always seek treatment for DH which indicate that they do not consider it to be a serious problem [1,5,6]. According to Addy [7], only 48% of those who suffered from DH complained to their Dentist and, they were also less likely to follow the recommendations for the resolution of the problem. There has also been limited data on the perception of Dentists in identifying and treating DH and several published studies or reviews have indicated that Dentists may be uncertain about the aetiology, diagnosis and effective management of Dentine Sensitivity/Dentine Hypersensitivity (DH) [5,8-12].

AIM

The purpose of the present questionnaire-based study was to evaluate the knowledge and understanding of UK based Dental professionals in treating Dentine Hypersensitivity (DH).

MATERIAL & METHOD

A 22-item questionnaire on DH was sent via the postal service (Royal Mail) to a representative sample of 2200 Dentists and Dental Hygienists/Therapists (DHTs). The study was submitted to the local Queen Mary University of London Ethics committee (QMREC 03537) and the research did not present any ethical concerns due to its low risk and therefore did not require the scrutiny of the full Research Ethics Committee.

The questionnaire consisted of 22 questions, which included both open and closed questions. The addresses were selected

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RESULTS

346 Questionnaires were returned during a 6-month period (15.7%), of those questionnaires returned 142 Questionnaires were from Dentists (12.9%) and 204 Questionnaires were from DHTs (18.5%). The age and experience in dental practice was reasonably similar in both groups, although the dental hygienists/therapists (DHTs) were predominantly female (41%M; 59%F). When asked on their practice setting, most DHTs worked either in the private sector (35%) or mixed working in the NHS with working in a private practice (47%), whereas Dentists either worked in the National Health Service NHS (48.6%), private practice or a mixture of NHS and private practice (29.7%). Of the Dentists who responded, the majority reported that the percentage of patients with DH ranged between 5%-15% whereas most DHTs reported that 15% to 50% of patients complained of DH (Q.3). When asked whether the patient initiated the conversion regarding DH 82.9% (n= 116) of Dentists and 76.9% (n=153) of DHTs indicated that the patient initiated the conversation with 4.3% (n=6) of Dentists and 3% (n=6) of DHTs indicating that the patient only occasionally ('sometimes') initiated the conversation. In response to whether the Dentist or DHTs initiated the conversation, only 23 of Dentists and 46 DHTs indicated that they initiated the conversation (Q5). In response to whether they observed any signs or symptoms of DH during their clinical examination 82.1% (n=115) of Dentists and 92.6% (n=187) of DHTs indicated that they had observed during their examination of patients. Regarding the severity of DH, Dentists reported that only 1-5% (69.1%; n=96) of patients considered the condition to be serious whereas DHTs reported that only 3-10% (57.2%; n=115) of their patients considered DH to be serious (Q.7). 32.8% (n=45) of Dentists and 37.9% (n=72) of DHTs indicated that DH lasted >12 weeks with 62.7% (n= 86) and 57.2% (n=108) of DHTs indicating a range of values up to 8 weeks (Q.8). When asked to indicate whether DH had a major impact on their patients' QoL (Q. 9), 44.7% (n=63) of Dentists (44.7%) and 66.3% of DHTs (n=134) indicated that DH had an effect on their patients' QoL. Most Dentists (64.1%; n=41) and 63.4% (n=85) of DHTs also indicated that the effect of DH on QoL was moderate in nature. From the responses to Q. 11 relating to the frequency of questions concerning DH, the most popular responses were 'often' (40.3%; n=56 [Dentists] and 48.3%; n=97 [DHTs] and 'sometimes' (47.5%; n=66 [Dentist] and 21.9%; n=44 [DHTs].

When asked to respond to Q. 12 regarding the aetiology of DH the commonly recognised aetiological features associated with DH were; 35.2% (n=50) of Dentists and 42.2% (86) of DHTs considered 1) abrasion to be a major cause of DH; with 2) gingival recession (35.2%; n=50 [Dentists] and 40.7% ; n=83)[DHTs]), 3) incorrect tooth brushing technique (39.4%; n=56 [Dentists]) and 39.7% n=81) [DHTs]), 4) exposed dentine tubules (30.3%; (n=53 [Dentists]) and 34.8% (n=71) [DHTs], 5) erosion (28.9%; n=41) [Dentists] and 26%; n=53 [DHTs]), and 6) attrition (14.1%; (n=20 [Dentists]) and 8.3% (n=17) [DHTs] (Table 1).

When asked to respond to the question on the steps taken to clinically diagnose a patient with DH (Q.13) the six most common diagnostic tools recommended by both Dentists and DHTs were 1) Clinical Examination (94.4%; n=134 [Dentists] and 71.1%; n=145 [DHTs]), 2) Clinical Sensitivity to Cold (71.13%; n= 101 [Dentists] and 43.9%; n=89 [DHTs]), 3) Dentine Hypersensitivity History (49.3%; n=70 [Dentists] and 62.3%; n=127 [DHTs]), 4) Radiographs (14.1%; n=20 [Dentists] and)(4.9%; n=10 [DHTs]), 5). 'eliminate the cause of DH' (12.7%; n=18 [Dentists] and 5.9%; n=12 [DHTs] and 6), Clinical sensitivity to hot (12%; n=17 [Dentists] and 4.9; n=10 [DHTs]) (Table 2).

When asked, what other dental conditions would you take into consideration when making a diagnosis of DH (Q.14) both Dentists and DHTs provided similar responses (Table 3). The main (selected) responses for both Dentists and DHTs were as follows: 1) Cracked Tooth Syndrome (84.5%; n=120 {Dentists] and 83.8%; n=171 [DHTs]), 2) Fractured Restoration (81%; n=115 [Dentists] and 83.3%; n=170 [DHTs] 3) Dental Caries (81.7%; 116 [Dentists] and 79.9%; n= 163 [DHTs]), 4) Post-Operative Sensitivity (84.5%; n=120 [Dentists] and 79.9%; n=163 [DHTs]), 5) Bleaching Sensitivity (75.4%; n=107 [DHTs] and 87.3%; n=178 [DHTs]), 6) Periodontal condition(67.6%; n=96 [Dentists] and 82.8%; n=169 [DHTs]), 7)), 8) Marginal Leakage (73.94%; n=105 [DHTs] and 69.6%; n=142 [DHTs]) and 9) Pulpitis (70.4%; n=100 [Dentists] and 55.4%; n=113) (Table 3).

Both Dentists and DHTs expressed similar responses to Q. 15

Table 1: Selected responses from Q.12 regarding an understanding of the aetiology of DH.

Selected Variable	Dentists (n)	DHTs (n)
Exposed Dentine	53	71
Gingival Recession	50	83
Abrasion	50	86
Fluid Movement	19	34
Exposed root surface	16	16
Wrong (incorrect) brushing	56	81
Periodontal Disease	15	27
Tooth Wear	16	0
Erosion	41	53
Attrition	20	17
Diet	15	16
Acidic Food	13	19
Grinding	6.3	2
Caries	5	10

Table 2: Selected responses from Q.13 on what steps would you take to clinically diagnose a patient with DH.

Selected Variable	Dentists (n)	DHTs (n)
Clinical Exam	134	145
Clin Sensitivity to Cold	101	89
Dental History	70	127
Radiographs	20	10
Cause Elimination	18	12
Clin Sensitivity to Hot	17	10
Probe	17	21
Visual Exam	17	40
Assess Recession	16	27
Diet History	15	23
Check Toothwear	14	19
Periodontal Condition	11	12
History of Sensitivity to Cold	10	21

Table 3: Selected responses from Q.14 on what other dental conditions would you take into consideration when making a diagnosis of DH.

Selected Variable	Dentists (n)	DHTs (n)
Cracked tooth syndrome	120	171
Fractured restoration	115	170
Dental caries	116	163
Periodontal condition	96	169
Post-op sensitivity	120	163
Pulpitis	100	113
Marginal Leakage	105	142
Bleaching sensitivity	107	178

on how confident the participants were in correctly diagnosing DH. For example, 21% (n=29) of Dentists indicated that they were very confident in diagnosis compared to the DHTs' response which was 8.7% (n=17), 47.8% (n=66) of Dentists indicated that they were confident in diagnosing DH compared to 45.9% (n=90) of DHTs. 28.9% (n=41) of Dentists indicated that they were somewhat confident compared with 39.8% (n=78) of DHTs. There were also smaller numbers of participants indicating that they were not confident in diagnosing DH (Figure 1).

When asked to identify the underlying mechanism of DH (Q16), 65.8% (n=79) of Dentists and 61.8% (n=108) of DHTs correctly identified the hydrodynamic theory as the accepted theory of DH, although 33.9% (n=41) of Dentists and 31.1% (n=58) of DHTs indicated that they did not know the underlying mechanism of DH. The responses from both Dentists and DHTs when asked which clinical or diagnostic aids that could use to eliminate any other possible causes of dental pain were similar (Q.17) (Figure 2). For example, the percentage response for Evaluation/Self Report and Clinical Examination was 95.1% (n=135) and 89.4% (n=127) for Dentists and 96.5% (n=197) and 80.4% (n=164) for DHTs respectively.

There were similarities between the responses to Q18 particularly with the first three treatment options (At Home [97.2%/97.5%], Education [93%/97.1%] and In Office [93%/94.1%] for both Dentists and DHTs (Figure 3). However, for the fourth option (restorative treatment) Dentists would opt for a restorative procedure compared to DHTs (90.1%; n=128 [Dentists], and 64.2%; n=131 [DHTs)] who would either refer to a Dentist (8.8%; n=18) or work under prescription with a Dentist. Other options (17.6%; n=25 [Dentists], and 32.8%; n=67 [DHTs] considered by both Dentist and DHTs were as follows: dietary/brushing/lifestyle advise (10.6%; n=21 [Dentists] and 12.7%; n=26 [DHTs]), fluoride (2.1%; n=3 [Dentists] and 5.4%; n=11 [DHTs]) or a bonding agent such as Seal and Protect or the use of Glass Ionomer Cements (GICs), for the restoration of cervical lesions (Class V) (3 responses (1.7%).

When asked to indicate how confident they were when recommending appropriate at-home materials to patients experiencing DH (Q.19), both Dentists and DHTs responded in the following manner. Dentists indicated that they either very confident (35.2%; n=50), confident (45.8; n=65)), somewhat confident (14.1; n=20) or not very confident (3.5%; n=5) compared to DHTs who were either very confident (55.6%; n=110), confident (32.8; n=65), somewhat confident (11.1; n=22), or not very confident (0.5%; n=1) (Figure 4).

When responding to whether patients had non-dental problems (such as stress etc.) in their daily life which may contribute to DH (Q.20), both Dentists and DHTs provided similar responses. For example, 58.3% (n=81), of Dentists and 61.9% (n=122), of DHTs indicated that in their opinion non-dental problems were associated with DH. 41% (n=57), of Dentists and 35.5% (n=72), of DHTs did not consider non-dental problems to be associated with DH. There were several responses from both Dentists and DHTs who either did not know or were not sure (2.2%; n=4).

On further analysis as to specific non-dental problems associated with DH there was a range of responses which included five main responses for both Dentists and DHTs as follows: 1) Bruxism (22.3%; n=31 [Dentists], and 29.4%; n=58 [DHTs]), 2) psychological stress (20.9%; n=33 [Dentists] and 28.4%; n=60 [DHTs]), 3) lowered pain threshold (1.4%; n=2 [Dentists], and 21.1%; n=43 [DHTs]), 4) Lifestyle (4.2%; n=6 [Dentists] and 6%; n=9 [DHTs] and 5) Parafunction (4.2%; n= 6 [Dentists] and 6%; n=9 [DHTs]). Other responses included acid reflux, bulimia, illness and fear of the Dentist (20.6% n=31) for both groups (Figure 5).

When asked if their patients complied with the professional advice provided for the treatment and management of DH, both groups indicated that their patients complied with the advice given to them (80.7%; n=113 [Dentists], and 89.5%; n=179 [DHTs]). However 17.1% (n=24), of Dentists and 9.5% (n=19) of DHTs indicated that their patients were non- compliant with 2.1% (n=3), of Dentists and 0.5% (n=1), of DHTs indicating that sometimes their patients were compliant.

The final question in the questionnaire asked the participants whether they considered a need for any additional patient information on DH (Q. 22). 77.9% (n=109), of Dentists and 75.9% (n=151), of DHTs indicated that there was a need for more information with 22.1% (n=31) of Dentists and 24.1% (n=48) of DHTS disagreeing with their colleagues as to whether there was

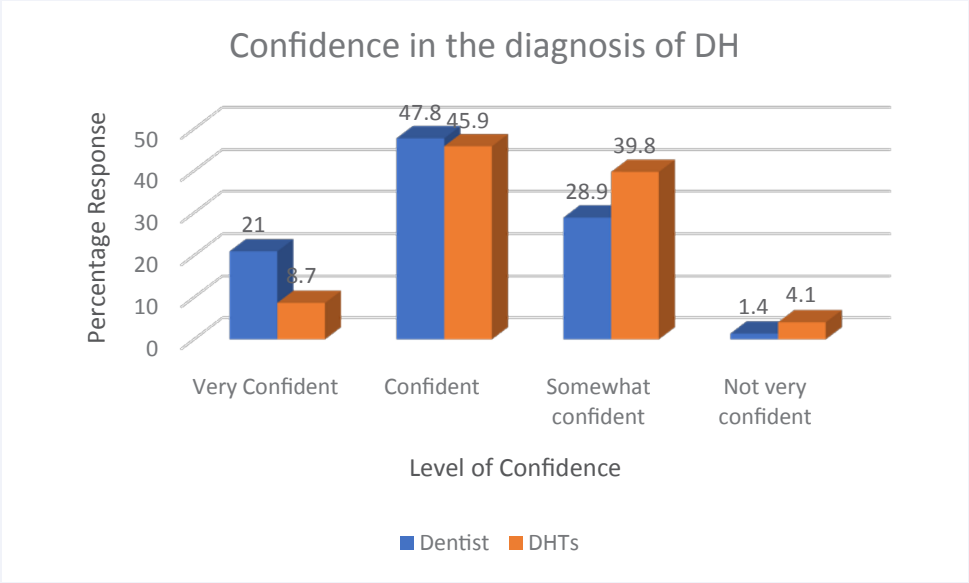

Figure 1 Level of Confidence in the Diagnosis of DH.

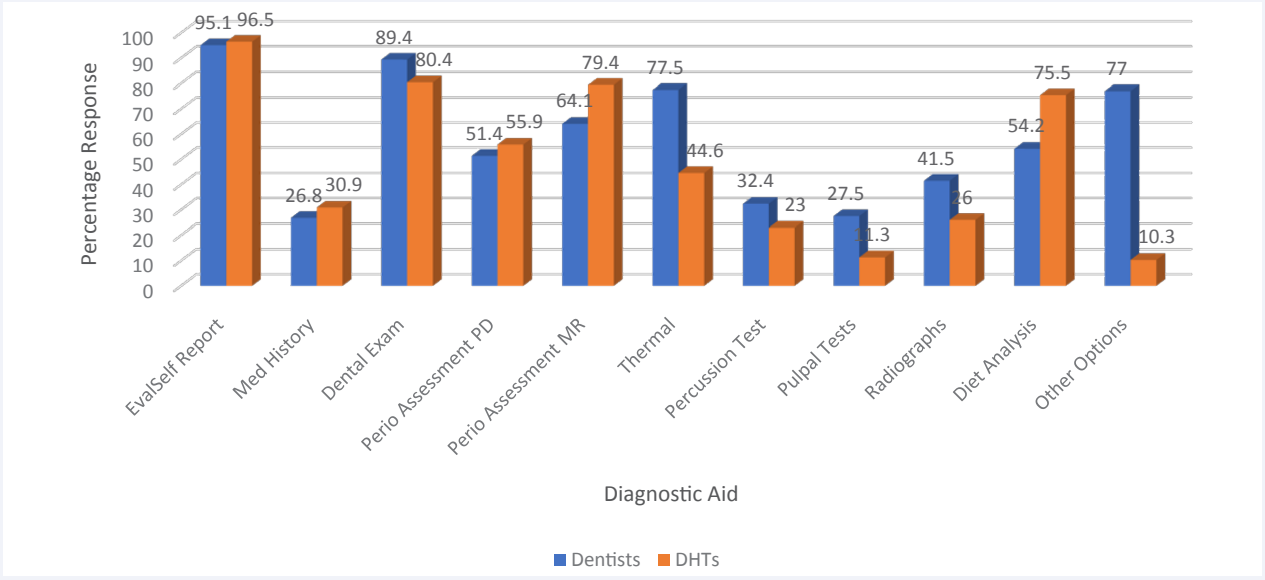

Figure 2 Diagnostic aids use to determine a diagnosis of Dentine Hypersensitivity.

a need for further information on DH. There were 54 responses from Dentists and 92 from DHTs (total 146 responses), of those respondents who recommended additional information for providing patient leaflets, the main responses from the Dentists and DHTs were 1) underlying causes of DH (3.5%; n=5 [Dentists], and 13.7%; n=28 [DHTs]), 2) knowledge about DH (12.7%; n=18 [DHTs] and 10.8%; n=22 [DHTs]), 3) treatment options (10.6%; n=15 [Dentists] and 10.3%; n=21 [DHTs]), 5) tooth brushing (5.6%; n=8 [Dentists] and 8.8%; n=18 [DHTs]) and 4) reminders to patients (4.2%; n=6 [Dentist] and 9.8%; n=20 [DHTs]) . Other options were also suggested by the two groups and these included general information (13.4%; n=19 [Dentists] and 8.8%; n=18 [DHTs]), correcting incorrect information (10%; n=7 [Dentists] and 8.8%; n=18 [DHTs] and dietary advice (2.8%; n=4 [Dentists] and 7.8%; n=16 [DHTs (Figure 6).

Further analysis was performed using Pearson Correlations to determine whether there were any associations between 1) Status (Dentists/DHTs) and their opinions concerning the impact of DH on QoL, 2) Years from Graduation (Dentists/DHTs) and the impact of DH on QoL and 3) Status (Dentists/DHTs) and the level of confidence in recommending at-home products to patients. No positive associations were observed.

DISCUSSION

There have been a number of studies that have explored whether Dentists have an understanding of the salient features

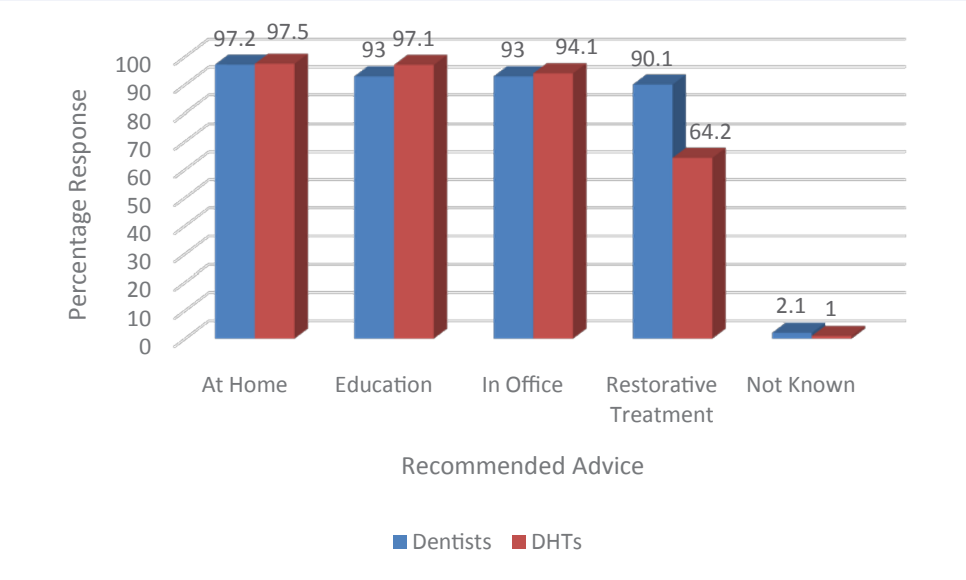

Figure 3 Recommended Advice to Patients by Dentists and DHTs.

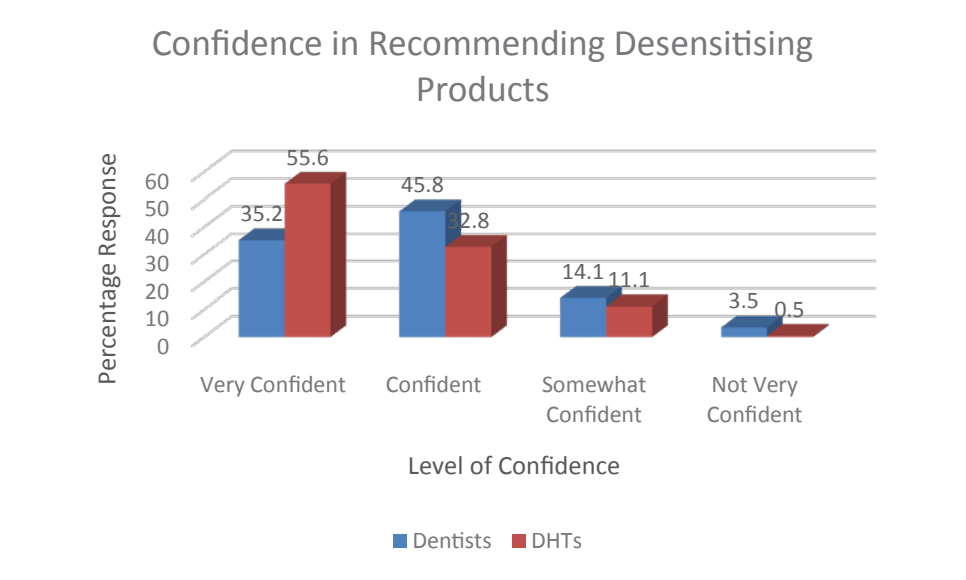

Figure 4 Confidence in Recommending Desensitising Products.

underlying the problem of DH in terms of its mechanism, aetiology and management [5,8-20], although there is limited data on the understanding of other dental professional such as Dental Hygienists and Dental Therapists. As far as the Authors are aware there has been only one previously published study that has addressed this [9], and the present study is the first UK study to determine whether there are any differences in understanding of DH between Dentists and their professional colleagues (DHTs). The questionnaire used in the present study was based on a previous UK questionnaire study [8] which was originally translated from a questionnaire study by Schuurs *et al.* [13]. According to Hatton *et al.* [12], the questionnaire has been subsequently validated in several studies both in the UK, Brazil, India, Kuwait and, Greece [5, 8, 15,17,18]. The low response rate from the dental practices was disappointing although it was comparable to the Canadian Dental Consensus study [9]. There are several reasons why individuals do not return questionnaires for example, they are too busy to complete a two-three paged document, the questionnaire may challenge their knowledge base and therefore may be reluctant to complete it, not interested as it is not in their area of expertise, the questionnaire is unattractive and does not appeal [5]. The questionnaires were sent via the Royal Mail (Postal Service) and in retrospect we may have improved our return rate by using digital platforms such as Survey Monkey which was successfully used in a later questionnaire study [17]. Due to constraints we were unable to

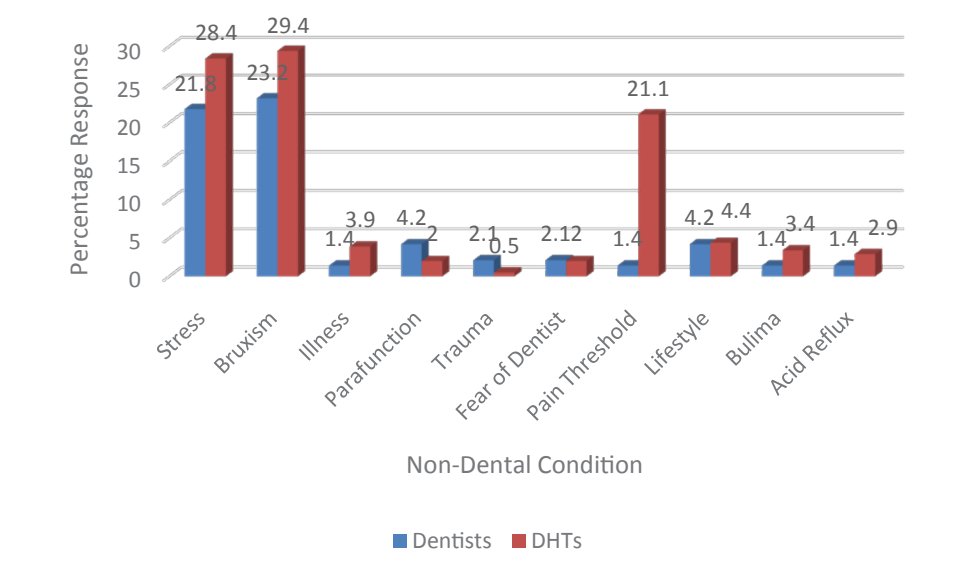

Figure 5 Non-Dental Conditions associated with DH.

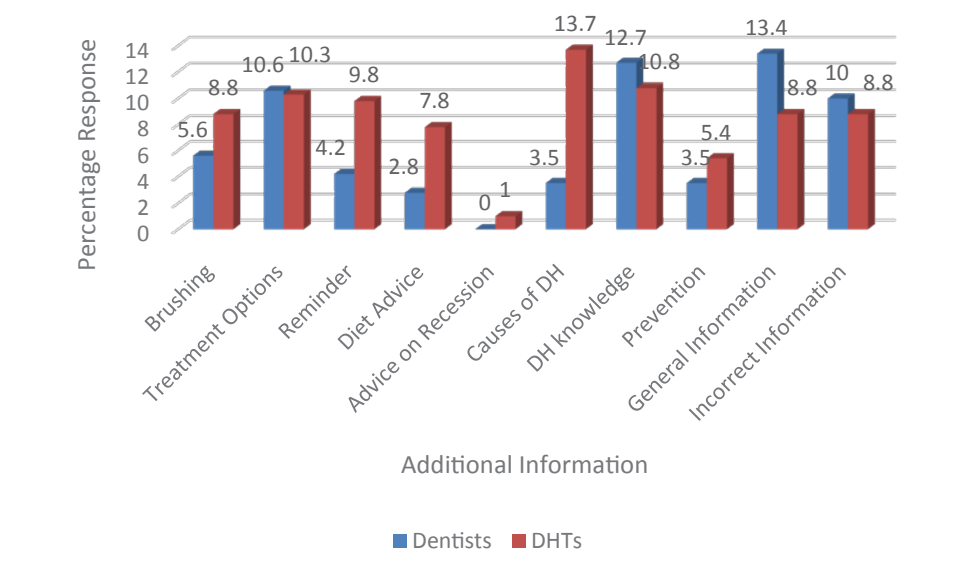

Figure 6 Recommended Additional Information for a leaflet.

send reminders which if we did may have increased our response rate. There were also a number of returned questionnaires from practitioners who indicated that they had retired from practice and as such were not interested in co-operating with the study (<3 questionnaires) as well as returned questionnaires where the participant was no longer at that address (<10 questionnaires).

The observations form the Canadian Consensus document [9], indicated that there was an under reporting of DH by the participants who also expressed a lack of confidence in the management of DH, the present study supported these observations although there was an awareness of the prevalence of DH in their respective practices. There was however a difference between the determination of the prevalence between the Dentists and their colleagues who reported a range between 5% to 15% (Dentists), and a higher range from 15% to 50% for DHTs with both ranges in agreement of the published prevalence rates in the literature although the 5-15% may be more consistent with the rates reported by Cuhna-Cruz and Wataha [21]. In the present study patients were reported to have initiated the conversation on DH which is in agreement with previous studies [1], most of the participant in this study also indicated that there were aware of the signs of DH during a clinical examination although numerically more DHTs noted these signs compared to Dentists. The present study also concurred with other published studies that patients with DH did not consider it to be a major problem that necessitated a visit to their Dentists and would initially

self-treat [1,5, 12], although there was a recognition that the discomfort from DH could last up to 12 weeks or more. It was also evident that the participants indicated that DH had a moderate impact on the QoL of those with DH which is also in keeping with the published literature although numerically more DHTs recognised this impact compared to Dentists [1]. Both Dentists and DHTs provided similar responses regarding the aetiology of DH with abrasion, gingival recession and incorrect toothbrushing featuring as the main aetiological factors however it is recognised that once the dentine is exposed, erosion is pre-eminently involved in DH [8,22]. The most common diagnostic tests were in keeping with previous studies namely a clinical examination, dental history and, clinical sensitivity to cold (air blast), DHTs [7,8,12-15,17,18] although there can be variations on the main diagnostic tests used to assess DH [5, 10,17,20]. There were also similar responses from both Dentists and DHTs regarding the elimination of other dental conditions prior to a definitive diagnosis of DH (Differential diagnosis) and these observations were consistent with previously published questionnaire studies [5,8,9,12-20]. One of the problems that was highlighted in the Canadian Consensus Document [8], was the apparent lack of confidence and the results from the present study would indicate that there are concerns with the clinician ability to confidently diagnose DH which has also been highlighted in previous studies [12,15,16,17). A further problem highlighted in the Canadian Consensus document [1,8], was the misunderstanding regarding the underlying mechanism on DH, in the present study the majority of Dentists and DHTs indicated that the underlying mechanism of DH was the Hydrodynamic Theory, however there was a sizeable minority that either considered an alternative mechanism or were unsure. These results were consistent with published studies [5,13-16], although a previous study by Hatton *et al.* [12], in a hospital setting indicated that there was a good understanding of the hydrodynamic theory as the underlying action of DH. The differences between the results from a hospital setting compared to a general dental practice setting may suggest that the transfer of knowledge may take up to 15 years before it becomes accepted or normal practice [23].

When recommending advice to their patients both Dentists and DHTs responded in a similar manner although Dentists were more likely to recommend restorative management of the condition compared to DHTs. DHTs, however indicated that they were more confident in recommending desensitising products than Dentists. Regarding the impact of non-dental problems which may impact on their patients' QoL, both Dentists and DHTs responded in a similar positive manner and provided a wide range of options including psychological stress, bruxism, life style, a lowered pain threshold and parafunction, there is no evidence however that bruxism or parafunction contribute to DH [8]. In relation to whether there was a need for more information to be provided to their patients on DH, most Dentists and DHTs agreed that there was a need to provide such information although the participants differed in what aspects of DH should be provided which has also been raised in other studies using the same questionnaire design [5,7,12,15]. The recommendations for further information on DH by the participants was however something of an enigma since there are amble recommendations in the published literature on DH in terms of guidelines and management [8,24].

The results from the present study appear to be reasonably consistent with previous studies on DH and its management although there was often a wide range of options provided in these studies [8,9,20]. The questionnaire in the present study has been subsequently validated in several studies in the UK, Brazil, Greece, Kuwait and India [5,8,12,15,17,18].

CONCLUSION

The results were consistent with previous studies and, would appear to suggest that, in terms of knowledge and understanding of DH, both Dentists and DHTs had a broad understanding however there were still some confusion concerning aspects of the diagnosis and management of the condition and clinicians therefore need to be updated on the current recommendations and guidelines in the management of DH to both inform their patients in terms of awareness and prevention and to confidently diagnose and manage DH successfully .

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